

### 3.1.6 System Operations

The extraction wells are currently sampled quarterly as the system was in standby mode for 2019. **Table 3.1-2** provides the effluent limitations for meeting the requirements of the SPDES equivalency permit. Since the system was in standby mode in 2019 no influent/effluent samples were collected.

The following is a summary of the OU I system operations for 2019:

#### *January–December 2019*

The system remained in standby mode for the year . There was no increase in VOC concentrations observed in the extraction or monitoring well network that required the extraction wells to resume pumping.

### 3.1.7 System Operational Data

#### *Extraction Wells*

During 2019, the extraction wells did not operate. The wells were sampled quarterly during the year. VOC and tritium concentrations in samples from EW-1 and EW-2 are provided in **Table F-1**. Tritium was not detected in the extraction wells during 2019. TVOC levels in EW-1 and EW-2 remained low with maximum concentrations of 5.5 µg/L and 0.89 µg/L, respectively (**Figure 3.1-6**).

#### *System Influent and Effluent*

There were no influent or effluent samples as the system was in standby mode during 2019 (**Table F-2 and F-3**).

#### *Cumulative Mass Removal*

Approximately 369 pounds of VOCs were removed from the aquifer during system operation from 1996 through 2013 (**Figure 3.1-7 and Table F-4**).

#### *Air Discharge*

There were no air emissions as the system was in standby in 2019 (**Table 3.1-2**).

### 3.1.8 System Evaluation

Although the system remains in standby, post-closure groundwater monitoring continues, and no rebound of VOC concentrations has been observed. The OU I South Boundary Treatment System performance can be evaluated based on the decisions identified by applying the DQO process.

1. Is there a continuing source of contamination? If present, has the source area been remediated or controlled?

#### Current Landfill

VOCs continue to be observed immediately downgradient of the Current Landfill which is covered by an engineered cap. Due to high water table conditions it is suspected that the water table is continuing to periodically flush contaminants from the vadose zone and/or the bottom of the landfilled materials.

Table 3.1-1.  
OU I South Boundary Treatment System  
2019 SPDES Equivalency Permit Levels

Parameters	Permit Level (µg/L)	Max. Measured Value (µg/L)
pH	6.0 – 9.0 SU	NS
benzene	0.8	NS
chloroform	7.0	NS
chloroethane	5.0	NS
1,2-dichloroethane	5.0	NS
1,1-dichloroethene	5.0	NS
1,1,1-trichloroethane	5.0	NS
carbon tetrachloride	5.0	NS
1,2-dichloropropane	5.0	NS
methylene chloride	5.0	NS
trichloroethylene	5.0	NS
vinyl chloride	2.0	NS
1,2-xylene	5.0	NS
sum of 1,3- & 1,4-xylene	10.0	NS

Notes:  
SU = Standard Units  
NS = Not Sampled as the system was not operating

Table 3.1-2  
OU I South Boundary  
2019 Air Stripper VOC Emissions Data

Parameter	Allowable ERP* (lb/hr)	Actual** ERP* (lb/hr)
carbon tetrachloride	0.016	NS
chloroform	0.0086	NS
1,1-dichloroethane	10**	NS
1,2-dichloroethane	0.011	NS
1,1-dichloroethylene	0.194	NS
chloroethane	10**	NS
1,1,1-trichloroethane	10**	NS
trichloroethylene	0.119	NS

ERP = Emissions Rate Potential, stated in pounds per hour (lb/hr).

\* ERP is based on NYSDEC DAR-1 Regulations.

\*\* Actual rate reported is the average for the year.

\*\*\* 6 NYCRR Part 212 restricts emissions of VOCs to a maximum of 10 lb/hr without controls.

NS= Not Sampled

#### Former HWMF

2019 groundwater monitoring data included only a limited number of permanent wells as stated above. Based on historical data, we know that Sr-90 continues to slowly migrate south from this area. Temporary wells will be installed and sampled in 2020 to confirm the status of the plume.

#### 2. Were unexpected levels or types of contamination detected?

#### Current Landfill

No unexpected results were observed.

#### Former HWMF

The Sr-90 levels in the three newly installed former HWMF were lower than anticipated. Temporary wells will be installed to verify whether these permanent wells are ideally located to monitor high concentration segments of the plume.

#### 3. Has the downgradient migration of the plume been controlled?

#### Current Landfill VOCs

Yes, monitoring results indicate that the OU I onsite VOC plume has completed active remediation. VOCs periodically released from the Current Landfill are attenuating as they migrate south. The groundwater travel time from the Current Landfill to the BNL site boundary is approximately 12-15 years. Modeling simulations indicate that TVOC concentrations from the Current Landfill will attenuate to below 5 µg/L prior to reaching the site boundary. The modeling results are supported by the TVOC concentration data observed in sentinel monitoring well 098-99.

#### Former HWMF Sr-90

A plume of Sr-90 exceeding the 8 pCi/L DWS extends from the former HWMF yard to an area within the LISF, approximately 2,400 feet to the south. This plume is migrating slowly to the south as verified by monitoring data obtained over the past several years. As stated above, the annual temporary well installation has not been completed in time for this report. Sentinel wells downgradient of the leading edge of the plume continue to exhibit low Sr-90 concentrations.

Groundwater model simulations show the leading edge of the higher concentration area of Sr-90 arriving at the site boundary at levels above DWS in approximately 41 years (2058) and attenuating to below DWS by approximately 2081.

#### 4. Can individual extraction wells or the entire VOC treatment system be shut down or placed in pulsed pumping operation?

Yes, the system was approved for closure by the regulators in September 2019. There has been no significant VOC concentration rebound observed in either the extraction wells or monitoring wells since system shutdown in 2013. There are no downgradient plume core wells exhibiting individual VOCs above the AWQS.

4a. Are TVOC/Sr-90 concentrations in plume core wells above or below 50 µg/L or 8 pCi/L, respectively?

TVOCs

Monitoring well 088-109, located immediately southeast of the Current Landfill, has periodically shown TVOC concentrations exceeding 50 µg/L over the past several years. TVOC concentrations dropped off in 2019 with a value of less than 1 µg/L observed during the fourth quarter. Based on plume core well data, TVOC concentrations throughout the downgradient portion of the plume have been less than the system capture goal of 50 µg/L since January 2013.

Sr-90

Yes, Sr-90 was detected above 8 pCi/L in the network of permanent wells during 2019. The permanent well locations are shown in **Figure 3.1-4**.

4b. Is there a significant concentration rebound in core wells and/or extraction wells following shutdown?

No significant rebound of VOCs has been observed in either monitoring or extraction wells since the system was shut down in July 2013.

5. Has the groundwater cleanup goal of meeting MCLs for VOCs by 2030 been achieved? Has the groundwater cleanup goal of 8 pCi/L for Sr-90 been achieved?

VOCs

No. MCLs have not been achieved for individual VOCs in all wells. Several Current Landfill area wells have displayed individual VOC concentrations in exceedance of MCLs. There were no exceedances of MCLs in the post-closure downgradient wells in 2019 and one exceedance in 2019. A comparison of groundwater quality conditions are shown on **Figure 3.1-8** which compares the VOC plume from 1997 to 2019.

Sr-90

No. Characterization and monitoring are underway and will continue to track the movement and attenuation of the Sr-90 plume.

### 3.1.9 Recommendations

The following recommendations are presented for the OU I South Boundary Treatment System and groundwater monitoring program:

- Maintain the VOC post-closure groundwater monitoring program of an annual sample collection from post-closure wells: 098-99, 107-40, 107-41, 115-13, 115-16, and 115-51. Maintain quarterly sampling of Current Landfill sentinel well 098-99.
- Install temporary wells as needed adjacent to monitoring wells 088-100, 088-101, and 088-102 to assess whether they are appropriately screened in the highest concentration segments of the Sr-90 plume immediately downgradient of the source area. Install temporary wells as needed to fill monitoring data gaps and characterize extent of Sr-90 plume. This temporary well data will be incorporated into the CERCLA Five-Year Review Report.
- Discontinue sampling of monitoring wells 115-41 and 115-42 for Sr-90. These wells have been monitored since 1997 and no detections of Sr-90 have been observed.
- Discontinue the annual tritium sampling of monitoring wells 087-21, 088-13, 088-14, 088-20, 088-26, 098-21, 098-30, 099-04, 107-24, 107-40, 108-08, 108-12, 108-13, 108-14, 108-17, 115-03, 115-

13, 115-14, 115-15, 115-16, 115-28, 115-29, 115-30, 115-31, 115-41, 15-42, 116-05, and 116-06. There have been no tritium detections in any of these wells since 2014 or longer.

EW-18 was only turned on long enough to collect quarterly influent samples. The highest Freon-11 influent concentration was 3.0 µg/L in April. **Figures 3.2.2-3 and 3.2.2-4** show the Freon-11 treatment system influent concentrations over time.

**Table 3.2.2-1** shows the SPDES equivalency permit requirements for the treatment system. No effluent samples were collected during 2019 because the treatment system was maintained in standby mode until August when the Petition for Closure was approved by the regulatory agencies.

During 2019, the maximum Freon-11 influent concentration in Building 96 extraction well RTW-1 was 1.5 µg/L. Freon-11 was detected in the other Building 96 treatment well RTW-2 at concentrations up to 0.82 µg/L.

#### *Cumulative Mass Removal*

The Building 452 treatment system was not in operation during all of 2019. When the system was in operation, the average pumping rate for EW-18 was typically 50 gpm. The pumping and mass removal data for the Building 452 treatment system are summarized on **Table F-10**. While the Building 452 treatment system was in operation from March 2012 through March 2017, approximately 101 pounds of Freon-11 were removed from the aquifer. Furthermore, from December 2010 – March 2017, the Building 96 extraction well RTW-1 removed approximately 5.4 pounds of Freon-11 from the aquifer. Combined, the two treatment systems removed approximately 106 pounds of Freon-11. During 2019, Freon-11 was either not detected or at trace levels in Building 96 influent samples, therefore a mass removal calculation was not performed.

#### **3.2.2.6 System Evaluation**

The Building 452 Freon-11 Treatment System performance can be evaluated based on the decisions identified by applying the DQO process.

##### 1. Is there a continuing source of contamination? If present, has the source area been remediated or controlled?

There is no continuing source of contamination.

Freon-11 concentrations in source area monitoring wells are below the 5 µg/L AWQS.

##### 2. Were unexpected levels or types of contamination detected?

No. Most Freon-11 concentrations are presently below the 5 µg/L AWQS.

**Table 3.2.2-1**  
Building 452 EW-18 Treatment Well  
2019 SPDES Equivalency Permit Levels

Parameter	Permit Level (µg/L)	Max. Measured Value (µg/L)
pH range	5.0–8.5 SU	NS
benzene	1.0	NS
bromodichloromethane	50.0	NS
carbon tetrachloride	5.0	NS
chloroform	7.0	NS
dichlorodifluoromethane	5.0	NS
1,1-dichloroethylene	5.0	NS
4-isopropyltoluene	5.0	NS
methyl chloride	5.0	NS
methylene chloride	5.0	NS
tetrachloroethylene	5.0	NS
toluene	5.0	NS
1,2,3-trichlorobenzene	5.0	NS
1,1,1-trichloroethane	5.0	NS
trichlorofluoromethane	5.0	NS
1,2,4-trimethylbenzene	5.0	NS
xylenes (m+p)	5.0	NS

SU: Standard Units

NS: Parameter not sampled or measured

3. Has the downgradient migration of the plume been controlled?

Yes. The Freon-11 plume has been successfully remediated by the combined operations of extraction wells EW-18 and RTW-1.

4. Can individual extraction wells or the entire treatment system be shut down or placed in pulsed pumping operation?

Yes. Building 452 treatment system operations ended following regulatory agency approval of the Petition for Closure in August 2019. The treatment system is currently being used to treat water from Building 96 extraction well RTW-1.

5. Has the groundwater cleanup goal of meeting MCLs been achieved?

The 5 µg/L MCL for Freon-11 has been achieved in the source area and in most downgradient areas. Remaining Freon-11 is expected be captured by the Building 96 treatment system or to decrease to less than the MCL via natural attenuation.

**3.2.2.7 Recommendations**

The following are recommendations for the Building 452 Freon-11 extraction well EW-18 and monitoring wells:

- The monitoring program for the Building 452 treatment system has concluded. Incorporate monitoring wells 085-386 and 095-313 into the Building 96 monitoring program.
- Postpone decisions to abandon extraction well EW-18 and the remaining monitoring wells until the PFAS plume originating from the former firehouse area has been fully characterized.